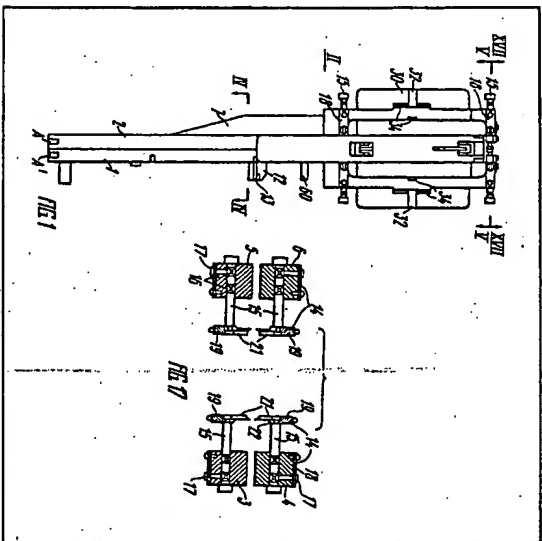


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- (54) Device for applying anastomoses onto hollow organs
- (57) A device for applying anastomoses onto hollow organs comprises two substantially similar parts provided with means for their coupling and each one of said parts includes two pivotally connected handles 1, 2. Each handle carries at the free end thereof flat plates 3, 4, 5, 6, the pair of these plates defining a flat clamp when the handles are brought together. The device further incorporates magazines 54 with pushers 45 and dies 24 for bending the staples. The device is provided with means for shifting tissue along the axis thereof as a force or cushion is formed. This means includes a comb-like portion 19 with sharp points 28 provided on the plate projections, a slot 34 arranged on the inner side of the comb-like portion and engaging each projection, an adjustable support 15 carrying the comb-like plate for its travel in the plane parallel to the axis of the flat clamps, as well as retaining members 17 adapted to position adjustable support depending on the position of the comb-like plate. Used as dies 24 are needle-like dies.



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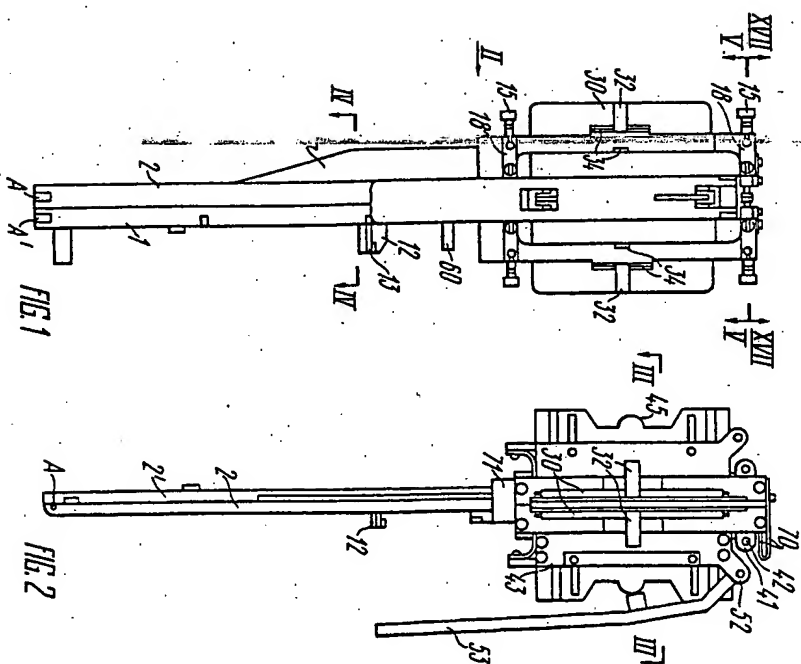
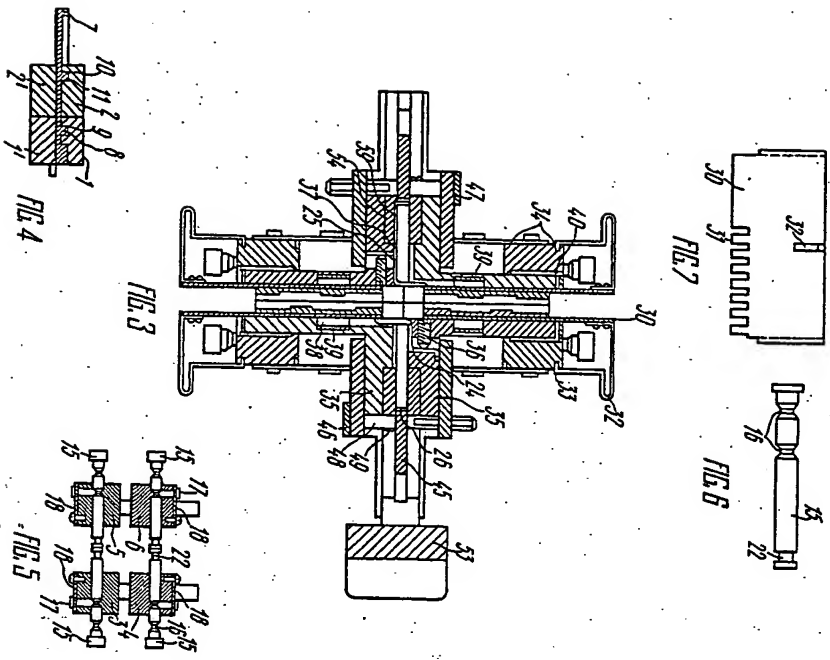


FIG. 2

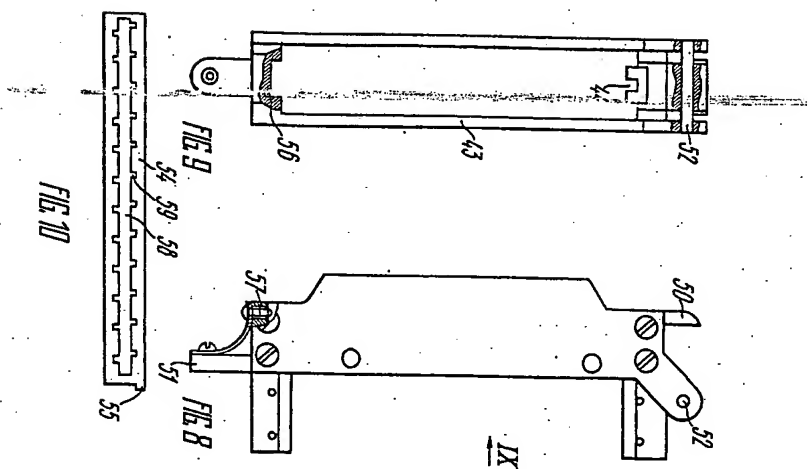
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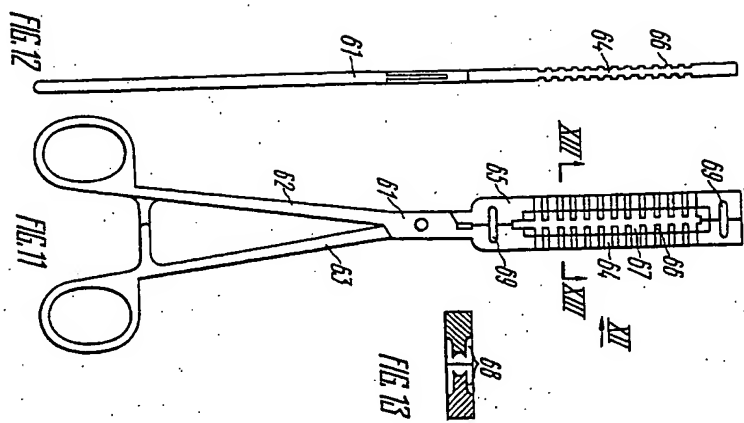
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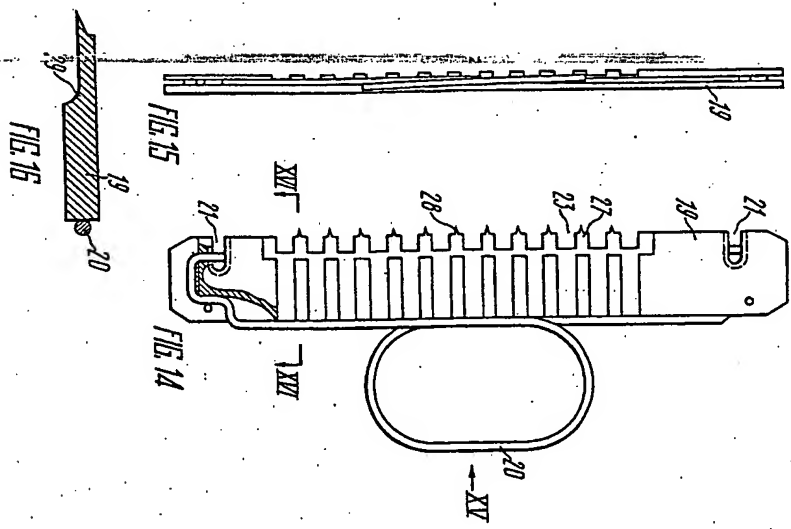
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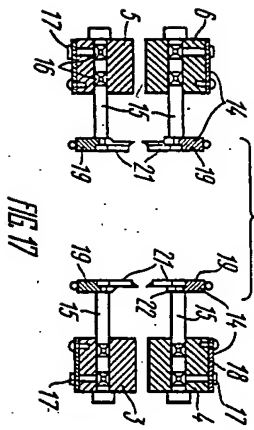


FIG. 17

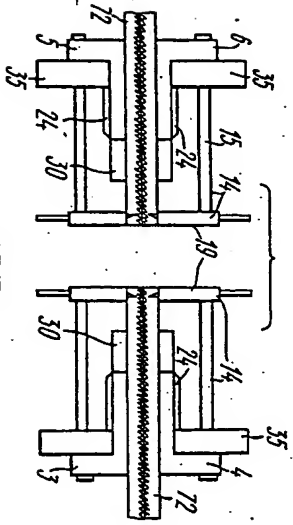


FIG. 18a

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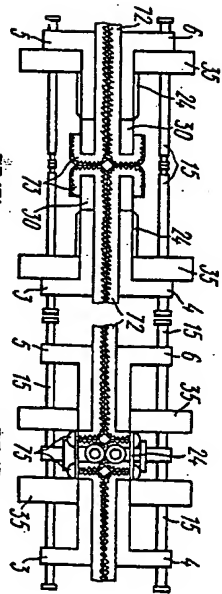


FIG. 18b

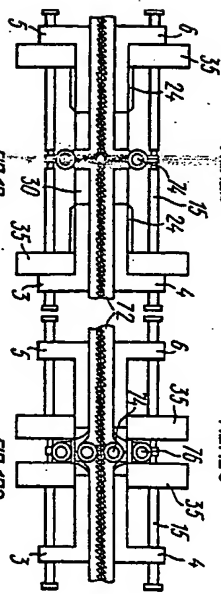


FIG. 18c

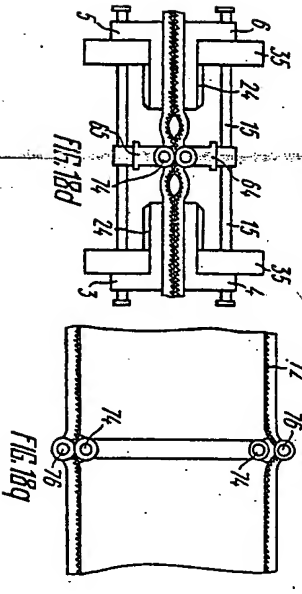


FIG. 18d

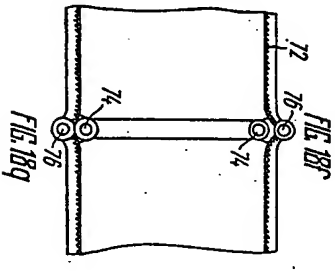


FIG. 18e

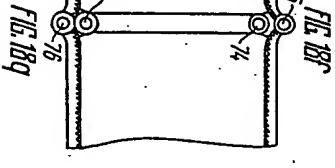


FIG. 18f

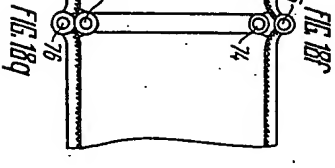


FIG. 18g

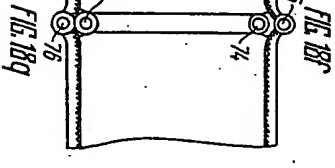


FIG. 18h

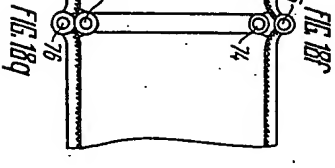


FIG. 18i

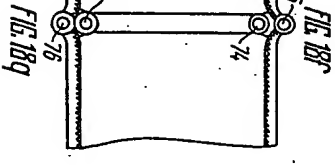


FIG. 18j

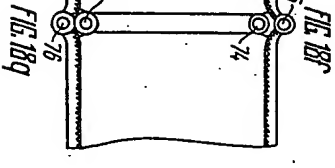


FIG. 18k

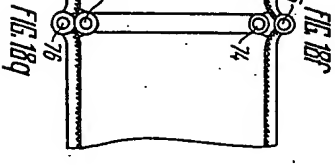


FIG. 18l

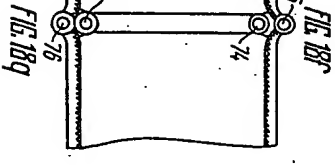


FIG. 18m

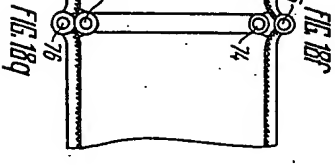


FIG. 18n

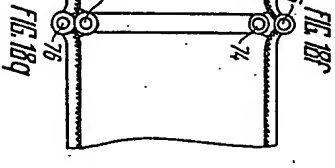


FIG. 18o

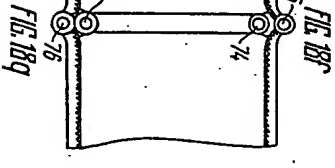


FIG. 18p

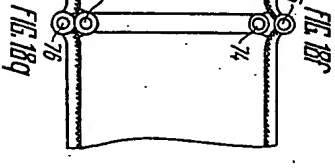
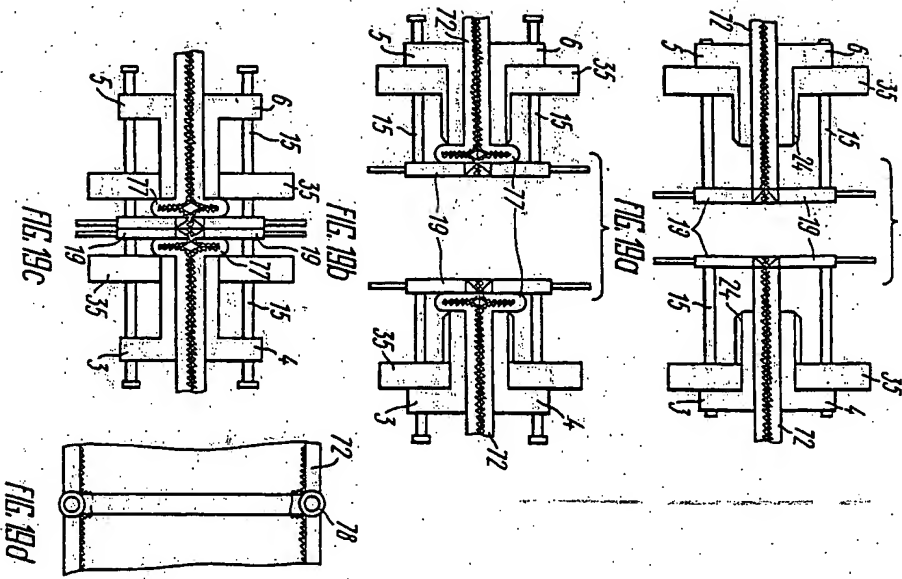


FIG. 18q

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SPECIFICATION

Device for applying anastomoses onto hollow organs

5 The present invention relates to medical instrumentation, and more particularly it relates to surgical suturing devices, such as devices for applying anastomoses onto hollow organs, e.g. the organs of the digestive tract, for instance, for joining intestines in the end-to-end, end-to-side or side-to-side manner, without introducing the working parts of the device into the lumen of the organs being sutured.

10 The present invention has for its aim to provide a construction of the suturing part of the device, which should enable to select the optimized-length portions of the organ to be sutured without taking the device off the organ, and to suture the walls exclusively through the serous-muscular layer.

20 This aim is attained in a device for applying anastomoses onto hollow organs, comprising two substantially similar parts provided with means for including two proximally connected handles, each handle carrying at its free end thereof a flat plate, the pair of these plates defining a flat clamp;

30 the flat plates being provided with grooves, pushers and dies for bending the staples or aggregates, mounted on the outer surface of the flat plates, in which device, in accordance with the invention, each clamp is provided with means for shifting layers of the intestine edge axially as a torus or cushion is formed, the 35 means including a plate having a comb so arranged that the longitudinal axis thereof passes along the connection plane of the coupled parts and adapted to travel only perpendicularly to the longitudinal axis of the connection plane, sharp points provided on the projections of the comb-like plate, whose height is somewhat less than the thickness of the intestine wall, a slot arranged on the inner side of the comb-like portion facing the intestine and engaging 45 the projection of the comb and partially the plane of the comb proper, an adjustable support carrying the comb-like plate and the flat plate forming the clamp, retaining members of the adjustable support adapted to fix thereof in a required position depending on the position of the comb-like plate after its 50 travel parallel to the axis of the flat clamps, whereas used as a die is a needle-like die, which die is movably mounted in the plane of flat plates forming the clamp.

55 It is expedient that each clamp should be provided with a removable plate with grooves, movably mounted immediately the plane of the needle-like dies and the outer surface of the flat plate of the clamp, for displacement relative to the edges of this plate.

60 It is further expedient that the adjustable supports adapted to travel in the plane of the axis of the flat clamps be in the form of rods with grooves engageable by the spring-biased retaining means.

According to one embodiment of the invention, 65 the flat plate defining the clamp has enlarged portions with grooves serving as guides for the displacement of the die and of the plate with the grooves.

Owing to the disclosed structure of the suturing 70 part of the device, the precise optimized-length portions of the organ would be always selected for forming the first and second level of the suture, independently of the personal experiences of the surgeon, thus possibly ensuring the minimized 75 reduction of the lumen of the anastomosis; the suturing would be conducted without compressing excessively the tissue of the organ along the line of the suture; it is possible to apply double-level buried sutures without shifting the device; when buried 80 sutures are made, it is ensured that the tissue is sutured exclusively through the serous-muscular layer.

The invention will be further described in connection with embodiments thereof, with reference being made to the accompanying drawings, wherein:

85 FIG. 1 is a general view in plan of a device embodying the invention;

90 FIG. 2 is a view taken along arrow line II-II of FIG. 1, in accordance with the invention;

95 FIG. 3 is a sectional view taken on line III-III of FIG. 1;

100 FIG. 4 is a sectional view taken on line IV-IV of FIG. 1;

105 FIG. 5 is a sectional view taken on line V-V of FIG. 1;

110 FIG. 6 shows the support in the form of a grooved rod;

115 FIG. 7 shows the movable plate;

120 FIG. 8 shows the housing adapted to accommodate the staple magazine (i.e. the magazine holder);

125 FIG. 9 is a view taken along arrow IX in FIG. 8;

130 FIG. 10 shows the comb magazine;

135 FIG. 11 shows the clamp for applying double-level buried sutures;

140 FIG. 12 is a view taken along arrow XII in FIG. 11;

145 FIG. 13 is a sectional view taken on line XIII-XIII in FIG. 11;

150 FIG. 14 shows the removable movable plate with the grooves;

155 FIG. 15 is a view taken along arrow XV in FIG. 14;

160 FIG. 16 is a sectional view taken on line XVI-XVI in FIG. 14;

165 FIG. 17 is a sectional view taken on line XVII-XVII in FIG. 1, with the comb-like plates mounted in the supports;

170 FIG. 18 illustrates the mode of applying a double-level buried suture;

175 FIG. 18a—same as FIG. 18, with the clamps applied to the ends of the intestines to be sutured;

180 FIG. 18b—same as FIG. 18, with the ends of the intestines to be sutured prepared on the extended removable grooved plates;

185 FIG. 18c—same as FIG. 18, with the first suture level made; the grooved plates are traced inward, and the needle-like dies are spread;

190 FIG. 18d—same as FIG. 18, with the clamp applied to the first suture level, to apply a double-level buried suture;

195 FIG. 18e—same as FIG. 18, with the handles moved closer together to form cushions of the walls

of the incisions being sutured, and the cushions are placed by the needle-like dies.

FIG. 18b—same as FIG. 18, with the second suture layer applied.

FIG. 18c illustrates the cross-section of the double-level suture.

FIG. 18d illustrates the routine of applying a single-level suture.

FIG. 18e—same as FIG. 18, with the handles without the grooved plates applied to the ends of the incisions to be sutured.

FIG. 18f—same as FIG. 18, with comb-like plates having been moved to form cushions of the walls of the incisions to be sutured.

FIG. 18g—same as FIG. 18, with the handles coupled and the cushions impelled onto the needle-like dies.

FIG. 18h illustrates the cross-section of a single-level suture.

Referring now to the expanded drawing, the device for suturing organs comprises two pairs of handles 1, 1' and 2, 2' (FIG. 1, 2 and 4) each handle carrying at the free end thereof flat plates 3, 4 and 5, 6 respectively (FIG. 6). The handles of each pair are pivotally connected, as is shown, for instance, by symbols A and A', so that the flat plates 3, 4 and 5, 6 forming a clamp are arranged in pairs in opposition to one another. The pairs of the pivotally connected handles 1, 1' and 2, 2' are interconnected by a wedge 7 provided on the handle 1, of which the projection 8 (FIG. 4) is received in a slot 6 of the handle 1, while the tapered projection 10 is received in a slot 11 of the handle 1, and 2 in a parallel fashion is provided for the handle 2 and to fit in place, there is provided a projection 12 with a slot 13 to fit the wedge 7 in the adjusted position. Each clamp is provided with means 14 for shifting layers of the incisional edges suitably as a torus or cushion is formed, adapted to press the length of the portions intended for forming the sutures. Each means 14 includes four rods 15 (FIG. 8, 6) arranged on the ends of the flat plates 3, 4, 5, 6 which are essentially adjustable supports adapted to travel only perpendicular to the axis of the flat plates 3, 4 and 5, 6. The ends 15 are provided with indentations 16 (FIG. 6) engaging retelling members 17 which are urged by springs 18. Each means 14 incorporates two comb-like plates 19 (FIG. 14, 17) so arranged that the longitudinal axes thereof pass along the connection plane and adapted to travel only perpendicular to the longitudinal axis of the connection plane. The comb-like plates 19 are provided with springs 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

FIG. 18b—same as FIG. 18, with the second suture layer applied.

FIG. 18c illustrates the cross-section of the double-level suture.

FIG. 18d illustrates the routine of applying a single-level suture.

FIG. 18e—same as FIG. 18, with the handles without the grooved plates applied to the ends of the incisions to be sutured.

FIG. 18f—same as FIG. 18, with comb-like plates having been moved to form cushions of the walls of the incisions to be sutured.

FIG. 18g—same as FIG. 18, with the handles coupled and the cushions impelled onto the needle-like dies.

FIG. 18h illustrates the cross-section of a single-level suture.

Referring now to the expanded drawing, the device for suturing organs comprises two pairs of handles 1, 1' and 2, 2' (FIG. 1, 2 and 4) each handle carrying at the free end thereof flat plates 3, 4 and 5, 6 respectively (FIG. 6). The handles of each pair are pivotally connected, as is shown, for instance, by symbols A and A', so that the flat plates 3, 4 and 5, 6 forming a clamp are arranged in pairs in opposition to one another. The pairs of the pivotally connected handles 1, 1' and 2, 2' are interconnected by a wedge 7 provided on the handle 1, of which the projection 8 (FIG. 4) is received in a slot 6 of the handle 1, while the tapered projection 10 is received in a slot 11 of the handle 1, and 2 in a parallel fashion is provided for the handle 2 and to fit in place, there is provided a projection 12 with a slot 13 to fit the wedge 7 in the adjusted position. Each clamp is provided with means 14 for shifting layers of the incisional edges suitably as a torus or cushion is formed, adapted to press the length of the portions intended for forming the sutures. Each means 14 includes four rods 15 (FIG. 8, 6) arranged on the ends of the flat plates 3, 4, 5, 6 which are essentially adjustable supports adapted to travel only perpendicular to the axis of the flat plates 3, 4 and 5, 6. The ends 15 are provided with indentations 16 (FIG. 6) engaging retelling members 17 which are urged by springs 18. Each means 14 incorporates two comb-like plates 19 (FIG. 14, 17) so arranged that the longitudinal axes thereof pass along the connection plane and adapted to travel only perpendicular to the longitudinal axis of the connection plane. The comb-like plates 19 are provided with springs 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

from one another. The comb 35 of the needle-like dies 24 are spread. The retelling projections 31 of the removable plates 30 project from the plates 3, 4, 5 and 6. The handles 1 and 2 are spread.

The wedge 7 is in its initial position. The comb-like plates 19 are connected with the rods 15 which are extended from the plates 3, 4, 5 and 6 by the maximum extent (FIG. 17).

The plates 3, 4, 5 and 6 on the handles 1 and 2 are then applied onto the ends of the organs 72 to be sutured and locked with the spring lock 70 and rotatable clip 71. The ends of the organs are trimmed along the outer side of the comb-like plate 19 (FIG. 18a), whereafter the comb-like plates 19 are removed. The ends of the organs are prepared by being pulled over the projections 31 of the removable plates 30, to form cuff-like elements 73; the handles 1 and 2 are joined and brought together until the walls of the organ to be sutured meet (FIG. 18b). The comb 35 of the needle-like dies 24 are brought together, and the magazine holders 43 with the loaded magazines 54 therein are connected to the comb 35. The safety devices 46 are pulled away, and the arm 53 is operated to press the pushers 45, in which way suturing at both sides is performed. Then the magazine holders 43 are removed, and the comb 35 of the needle-like dies 24 are spread, and the first level of the sutures 74 has been thus applied (FIG. 18c).

The removable plates 30 are retracted into the plates 3, 4, 5 and 6, and the clamp 61 is applied onto the sutures, for the jaws 64, 65 to hold the first level of the sutures (FIG. 18d). The handles 1 and 2 are brought closer together to form cushions 75. The comb 35 of the needle-like dies 24 are projected to get them closer together, whereby the needle-like dies 24 place the cushions 75 (FIG. 18e). The clamp 61 is removed,

- needling the cannula plate with the flat plate of the clamp, retaining members of the adjustable support adapted to fix it in a required position depending on the position of the cannula plate after the travel thereof parallel to the axis of the flat clamp, whereas used as each die is a needle-like die, which die is mounted with the provision to travel in the plane of flat plates defining the flat clamp.
2. A device according to claim 1 wherein each clamp is provided with a removable plates with grooves, movably mounted intermediate the plane of the needle-like dies and the outer surface of the flat plate of the clamp, for displacement relative to the edges of this plate.
3. A device of claim 1, wherein the adjustable supports adapted to travel in the plane of the axis of the flat clamps are made as rods with grooves engageable by spring-urged retaining means.
4. A device of claim 1, wherein the flat plate defining the clamp has enlarged portions with grooves acting as the guideways for the motion of the dies and the grooves plate.
5. A device for supplying anastomoses onto hollow organs, substantially as hereinbefore described and illustrated in the appended drawings.

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